MECHANICAL ABBREVIATIONS AREA DRAIN INSULATION A.F.F. ABOVE FINISHED FLOOR INVERT AFMS AIR FLOW MEASURING STATION KW KILOWATT AIR HANDLING UNIT LEAVING AIR TEMPERATURE ACID NEUTRALIZING BASIN LAVATORY ACCESS PANEL LEAVING WATER TEMPERATURE ARCH ARCHITECT MBH BTU PER HOUR (THOUSANDS) AIR SEPARATOR MCF THOUSAND CUBIC FEET AS BUTTERFLY DAMPER MANHOLE B/G BELOW GRADE NOISE CRITERIA OR NORMALLY CLOSED BTU BRITISH THERMAL UNIT BACKWATER VALVE NOT IN CONTRACT CCF HUNDRED CUBIC FEET NO NORMALLY OPEN CFH CUBIC FEET PER HOUR NOT TO SCALE CFM CUBIC FEET PER MINUTE OUTSIDE AIR CENTER LINE OPPOSED BLADE DAMPER CLG OVERFLOW CEILING OFL CO CLEAN OUT OVERFLOW ROOF DRAIN CONTR CONTRACTOR PD PRESSURE DROP OR DIFFERENCE CONV CONVECTOR PNEUMATIC-ELECTRIC CABINET UNIT HEATER PLBG CUH PLUMBING COLD WATER PRESSURE REDUCING VALVE OR PRV POWER ROOF VENTILATOR DB DECIBEL DF DRINKING FOUNTAIN POUNDS/SQ INCH ABSOLUTE PSIA DIA DIAMETER POUNDS/SQ INCH GAUGE PSIG DIFF DIFFUSER POLY VINYL CHLORIDE RETURN AIR DISCH DISCHARGE DMPR DAMPER REINFORCED CONCRETE PIPE DN DOWN ROOF DRAIN RD DR RECIRCULATING RECIRC REGISTER DOWNSPOUT DRAWING RETURN RELATIVE HUMIDITY EAT ENTERING AIR TEMPERATURE EDR EQUIVALENT DIRECT RADIATION REHEAT REHEAT COIL ELECTRIC-PNEUMATIC EWC ELECTRIC WATER COOLER RECIRCULATED HOT WATER RHW EWT ENTERING WATER TEMPERATURE ROOM EXHAUST REVOLUTIONS PER MINUTE EXP REPOCEDAIRONE BACKFLOW PREVENTER EXPANSION **FAHRENHEIT** SAN SANITARY SCFM FAN COIL CFM, STANDARD CONDITIONS FLOOR CLEAN OUT SMOKE DAMPER FIRE DAMPER OR FLOOR DRAIN STATIC PRESSURE FIRE HOSE CABINET SPECS SPECIFICATIONS FHR FIRE HOSE RACK SUP SUPPLY FLEX FLEXIBLE STM STEAM TEMPERATURE DIFFERENCE FIRE MAIN TEMP FEET PER MINUTE TEMPERATURE FPS FEET PER SECOND TONS TONS OF REFRIGERATION FEET OR FOOT T-STAT FLOAT AND THERMOSTATIC F&T TYPICAL FTG UP-BLAST FOOTING FINNED TUBE RADIATION UNDERGROUND FV FACE VELOCITY UNIT HEATER URINAL GAUGE SANITARY VENT GALLONS PER HOUR VARIABLE AIR VOLUME GALLONS PER MINUTE GPM VOLUME DAMPER GRILLE VELOCITY HOSE BIBB VFD VARIABLE FREQUENCY DRIVE VOL HANDS-OFF-AUTOMATIC SANITARY WASTE HOA WITHOUT HEATER WATER CLOSET HEATING, VENTILATING AND AIR CONDITIONING WALL CLEAN OUT HYDRANT WALL HYDRANT HOT WATER WATER GRADE CLEANOUT

	PLUMBING	P	LUMBING/PIPING		DUCTWORK
- AV	ACID VENT — BELOW GRADE	 ə	ELBOW DOWN	—	SUPPLY AIR
— AV — —	- ACID VENT — ABOVE GRADE - ACID WASTE — BELOW GRADE		CLEANOUT PIPE CAP		RETURN AIR EXHAUST AIR
AW	- ACID WASTE — ABOVE GRADE	 •	ELBOW UP	**	STANDARD BRANCH, NO SPLITTER — SUPPLY FLOW TO RIGHT —
DI	- DEIONIZED WATER - DOMESTIC COLD WATER	•	TEE, OUTLET UP		RETURN/EXHAUST FLOW TO LEFT
	- DOMESTIC COLD WATER - DOMESTIC HOT WATER		TEE, OUTLET DOWN	 	BELLMOUTH WITH BALANCING DAMPER
180 —	- DOMESTIC HOT WATER (TEMP. INDICATED)		CONNECTION, BOTTOM		FLEXIBLE DUCT
— — — — — — HARD — — —	- DOMESTIC RECIRCULATING HOT WATER - HARD COLD WATER		CONNECTION, TOP	<u>₹ ТЯ </u>	
OSD-	OVERFLOW STORM DRAIN — BELOW GRADE		- ECCENTRIC REDUCER		TURNING VANES
OSD	- OVERFLOW STORM DRAIN — ABOVE GRADE - REVERSE OSMOSIS WATER		CONCENTRIC REDUCERFLEXIBLE CONNECTION	<u> </u>	FLEXIBLE CONNECTION
v	SANITARY VENT — BELOW GRADE		- EXPANSION JOINT		MANUAL VOLUME DAMPER
	- SANITARY VENT — ABOVE GRADE	×	- PIPE ANCHOR	\$ \$	MANUAL VOLUME DAMPER
	SANITARY WASTE — BELOW GRADE SANITARY WASTE — ABOVE GRADE		ALIGNMENT GUIDECHECK VALVE	♥ MD	MOTORIZED DAMPER
- SDT	SOIL DRAINAGE TILE	×	- SHUTOFF VALVE	₹ FD	FIRE DAMPER & ACCESS PANEL
SOFT	- SOFTENED COLD WATER (SCW) - SOFTENED HOT WATER		PLUG VALVE COMBINATION BALANCE VALVE AND	• SD	
NP	NON-POTABLE WATER		AND FLOW METER		SMOKE DAMPER & ACCESS PANEL
TW		. 	- STRAINER	• FSD	COMBINATION FIRE/SMOKE DAMPER & ACCESS PANEL
D	- DRAIN - STORM DRAIN — BELOW GRADE	, A ;	- STRAINER W/BLOWDOWN VALVE AND CAP		
SD	- STORM DRAIN — ABOVE GRADE	&	PRESSURE REDUCING VALVE		SUPPLY GRILLE OR REGISTER
WW	- WELL WATER - EXISTING PLUMBING TO REMAIN	&	(SETTING AS NOTED, PSI) — AUTOMATIC CONTROL VALVE, 2—WAY		RETURN OR EXHAUST GRILLE OR REGISTER
	- EXISTING PLUMBING TO REMOVED	&	·		<u> </u>
		个	- AUTOMATIC CONTROL VALVE, 3-WAY		
ME	CHANICAL PIPING	<u> </u>	AUTOMATIC AIR VENT MANUAL AIR VENT		RETURN DUCT UP, NEGATIVE PRESSURE
BF	- BOILER FEEDWATER		PRESSURE RELIEF/SAFETY VALVE	₹ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	EXHAUST DUCT UP, NEGATIVE PRESSURE
BFS——CBD—	- BOILER FEEDWATER SUPPLY—TO PUMP - CONTINUOUS BLOWDOWN	&	(SETTING AS NOTED, PSI) DRAIN VALVE		
—— CH ———			- BALL VALVE		SUPPLY DUCT DOWN, POSITIVE PRESSI
		F	BUTTERFLY VALVE		RETURN DUCT DOWN, NEGATIVE PRESSUR
10#A	- COMPRESSED AIR (PSI INDICATED) - CONDENSATE DRAIN	 	DIAPHRAGM VALVEGLOBE ANGLE VALVE		
		<u></u> Ф	- O. S. & Y. VALVE		EXHAUST DUCT DOWN, NEGATIVE PRESSU
CWTT	- CONDENSER WATER TO TOWER - CONDENSER WATER SUPPLY		REDUCED PRESSURE ZONE		SUPPLY DIFFUSER/REGISTER BLANKOFF INDICATED DARK
— CR— —			BACKFLOW PREVENTER		RETURN GRILLE/REGISTER
FOS -	- FUEL OIL SUPPLY		MOTORIZED VALVE		METONN GNIELL/ NEGISTEN
- — FOR — — — — — — — — — — — — — — — — — — —		\	SOLENOID VALVE FLOW LIMITING VALVE		EXHAUST GRILLE/REGISTER
FOF —			- REFRIGERANT SIGHT GLASS		LINEAR DIFFUSER
GS	- GLYCOL SUPPLY - GLYCOL RETURN		GLOBE VALVEGAS PRESSURE REGULATOR VALVE		CONCENTRIC DUCT TRANSITION
HRS —			- BACKWATER VALVE	TT L	ECCENTRIC DUCT TRANSITION
— HRR — —			- REFRIGERANT DRYER		DUCT CONSTRUCTION PRESSURE CLASS—
———HWS—————————————————————————————————			FLOW DIRECTIONFLOW DIRECTION WITH PITCH	" ""	IFICATION (INCHES WATER AS NOTED) "N" INDICATES NEGATIVE PRESSURE
——HPS—		8	DUPLEX STRAINER	\$	RECTANGULAR-TO-ROUND DUCT
— HPR — — —— LPS ——			PIPE UNIONPIPE FLANGE		TRANSITION
- — LPR — —		_	- PUMP	<u> </u>	EXISTING DUCT TO REMAIN
LV		Q	PRESSURE GAUGE W/ PIGTAIL & PETCOCK	<u> </u>	EXISTING DUCT TO BE REMOVED
LA LPG			TUEDVOVETED		
2#G ———	- NATURAL GAS (PSI INDICATED)	<u> </u>	THERMOMETER —		SUPPLY TROFFER
—— PV ———		ψ	PRESSURE/TEMPERATURE TEST PORT		VAV BOX
R		<u></u>	- STEAM TRAP (TYPE INDICATED)		VAV BOX W/ REHEAT COIL
RADS	- RADIATION WATER SUPPLY		, ,		VAV DOA WY REFIERI CUIL
- — RADR — — —— RL ———		GPM	_ FLOW MEASURING STATION (FLOW INDICATED)		REHEAT COIL
	- REFRIGERANT SUCTION	p FS	FLOW SWITCH	→ DN UP	DUCT OFFSETS
— — RHG — — — - RHS —	- REFRIGERANT HOT GAS BYPASS - REHEAT WATER SUPPLY		_		
- RHR		P PS	PRESSURE SWITCH		
		<u> </u>	SHOCK ABSORBER		
— RRR — — — — — — — — — — — — — — — — —					
- —SHWR— —	- SECONDARY HEATING WATER RETURN		ELBOW		
SMS			- TEE		AND 10 - 1 - 1 - 1
TC	- TUBE CLEANER WATER SUPPLY	-	FLOOR DRAIN		ANNOTATION
- —10#STM——— ——10#R——	,		FLOOR SINK		— QUANTITY — TYPE
10#N	- STEAM RETURN (PSI INDICATED) - EXISTING PIPING TO REMAIN	WH #	WALL HYDRANT	(2) A-8"ø	
	- EXISTING PIPING TO REMOVED	нв +	HOSE BIBB	350	DIFFUSER IDENTIFICATION
		——ф	QUICK—COUPLE HOSE CONNECTOR FLOOR CLEANOUT		— CFM
	CONTROLS	<u>—</u> ф	GRADE CLEANOUT	X -	— DETAIL NUMBER
Ф	AQUA STAT		WALL CLEANOUT CEILING CLEANOUT	×	SHEET NUMBER
Θ	HUMIDISTAT OR SPACE R.H. SENSOR	<u></u> , 	- GAS COCK VALVE	x x	— SECTION NUMBER
®	REFRIGERANT SENSOR	•	ROOF DRAIN		— SHEET NUMBER
 ⊚	PRESSURE SENSOR/TRANSMITTER SMOKE DETECTOR	<u> </u>	DRAIN ABOVE	X	— EQUIPMENT DESIGNATION — EQUIPMENT NUMBER
	SPACE TEMPERATURE SENSOR	()	CATCH BASIN	•	POINT OF CONNECTION, NEW TO EXIST
<u> </u>				1	
	STATIC PRESSURE SENSOR THERMOSTAT		MANHOLE	Ŷ	POINT OF DISCONNECTION

SHEET INDEX

1326-M000 MECHANICAL TITLE SHEET 1326-MD101 FIRST FLOOR MECHANICAL DEMOLITION PLAN 1326-MP101 FIRST FLOOR PIPING PLAN 1326-M201 BOILER FEEDWATER FLOW DIAGRAM - DEMOLITION

1326-M202 BOILER FEEDWATER FLOW DIAGRAM - NEW WORK 1326-M301 MECHANICAL DETAILS AND SCHEDULES

ALTERNATES

ALTERNATE NO. 1: PROVIDE ADD ALTERNATE PRICING FOR PACKAGED FEEDWATER CONTROL SYSTEM. SEE SECTION 23 50 11 BOILER PLANT MECHANICAL EQUIPMENT FOR ADDITIONAL INFORMATION.

CD ISSUE FULLY SPRINKLERED

GENERAL CONTRACTOR AND/OR ALL SUBCONTRACTORS SHALL FIELD VERIFY ALL DIMENSIONS SHOWN ON THESE PLANS AND SHALL BE RESPONSIBLE FOR VARIATIONS BETWEEN PLAN DIMENSIONS AND ACTUAL FIELD DIMENSIONS. WHERE VARIATIONS ARE FOUND TO OCCUR, THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER IN WRITING PRIOR TO PROCEEDING WITH CONSTRUCTION; NO ADJUSTMENT TO THE WORK WILL BE MADE WITHOUT THE PRIOR APPROVAL OF THE PROJECT ENGINEER. THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER IN WRITING PRIOR TO PROCEEDING WITH CONSTRUCTION; NO ADJUSTMENT TO THE WORK WILL BE MADE WITHOUT THE PRIOR APPROVAL OF THE PROJECT ENGINEER.

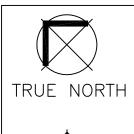
GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR GENERAL DEMOLITION INCLUDING REMOVAL OF WALLS, PARTITIONS, DOORS & CEILING & FLOORS. ANY AND ALL CUTTING OF CONCRETE FLOORS, WALLS OR STRUCTURE SHALL BE THE GENERAL CONTRACTOR'S RESPONSIBILITY. CORE DRILLING THROUGH CONCRETE WALLS, FLOORS OR STRUCTURE FOR PIPING OR CONDUIT SHALL BE THE RESPONSIBILITY OF THE SUBCONTRACTOR BY TRADE; FIRESTOPPING OF THESE OPENING SHALL BE DONE BY THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. PATCHING AND REPAIR OF CONCRETE WALLS, FLOOR, OR STRUCTURE SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR; THIS WILL BE ACCOMPLISHED UPON COMPLETION OF THE INSTALLATION OF ANY AND ALL UTILITIES INSTALLED BY THE VARIOUS SUBCONTRACTORS.

one-eighth inch = one foot

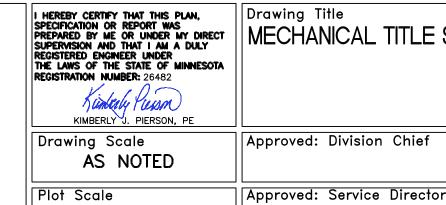
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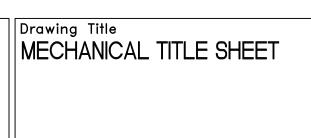
Dunham Associates, Inc. 50 South Sixth Street / Suite 1100 Minneapolis, Minnesota 55402-1540 PHONE 612.465.7550 FAX 612.465.7551 weв dunhameng.com mechanical + electrical consulting engineering



PLAN NORTH



12" = 1'-0"



Project Title ENERGY CENTER **EQUIPMENT REPLACEMENT** PROGRAM Location V.A. MEDICAL CENTER ONE VETERANS DRIVE MINNEAPOLIS, MN 55417

04/07/2016

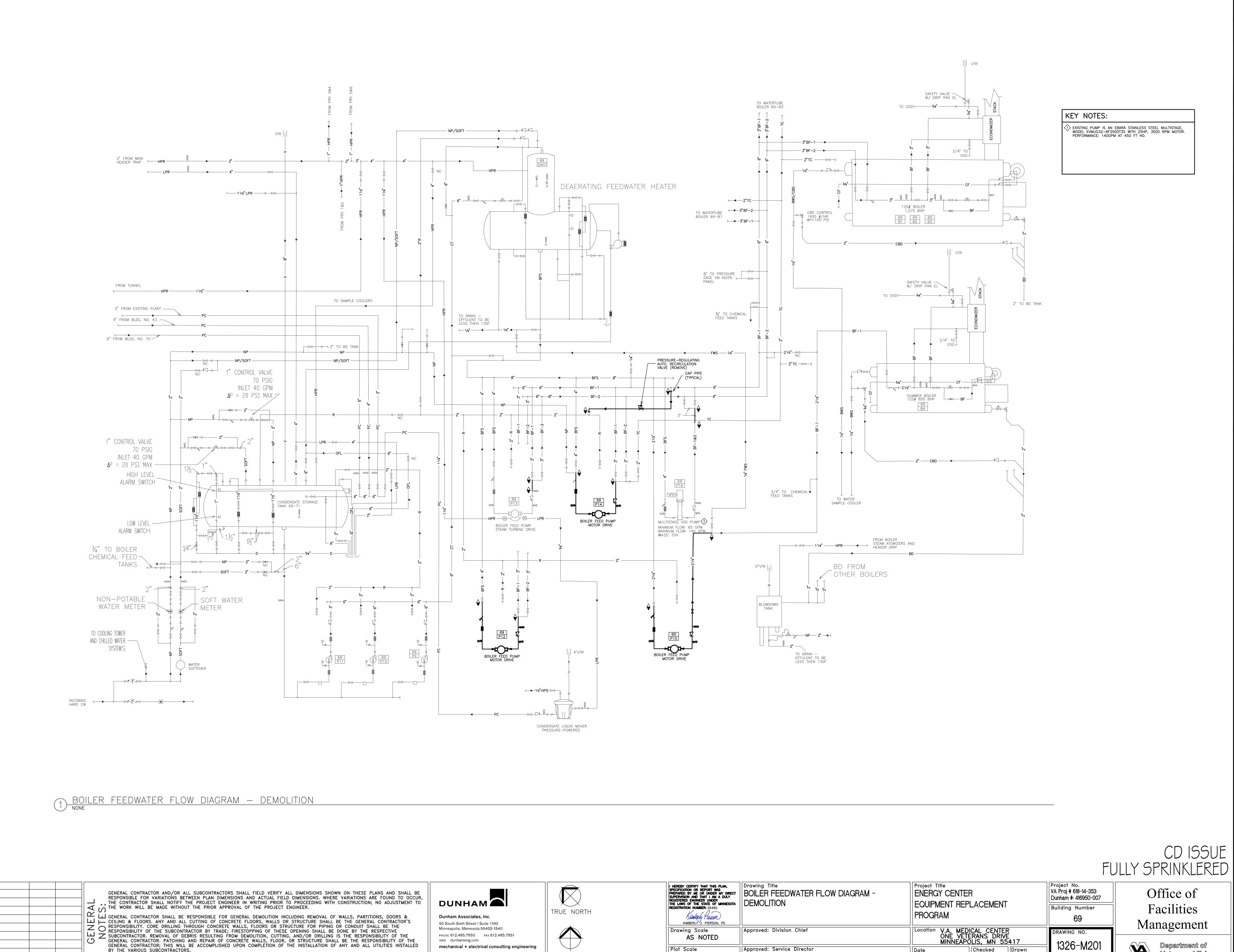
Project No. VA Proj # 618-14-353: Dunham #: 416950-007 Building Number DRAWING NO.

1326-M000

Dwg. 1 Of **9**

Office of Facilities Management





TRUE NORTH

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Minneapolis, Minnesota 55402-1540

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mechanical + electrical consulting engineering

Kinderly Pusan KIMBERLY J. PIERSON, PE

12" = 1'-0"

AS NOTED

Drawing Scale

Plot Scale

Approved: Division Chief

Approved: Service Director

PROGRAM

04/07/2016

Location V.A. MEDICAL CENTER ONE VETERANS DRIVE MINNEAPOLIS, MN 55417

DRAWING NO.

Drawn

1326-M201

Dwg. **4** Of **9**

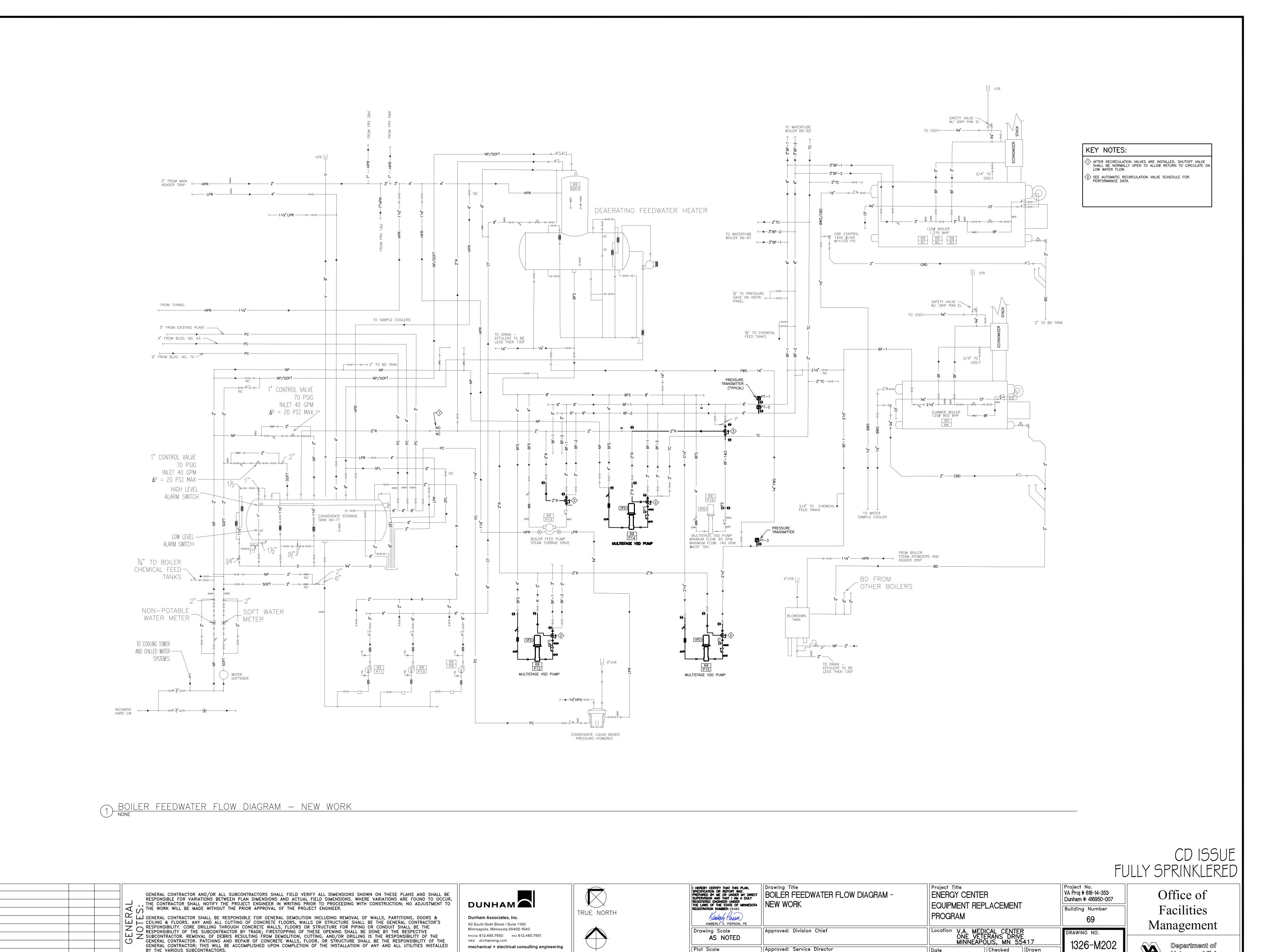
one-eighth inch = one foot

0 4 8 16

BY THE VARIOUS SUBCONTRACTORS.

DATE

Facilities Management Department of . Veterans Affairs



AS NOTED

12" = 1'-0"

Approved: Service Director

Plot Scale

1326-M202

Dwg. **5** Of **9**

Drawn

04/07/2016

Department of

. Veterans Affairs

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mechanical + electrical consulting engineering

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one-eighth inch = one foot

0 4 8 16

BY THE VARIOUS SUBCONTRACTORS.

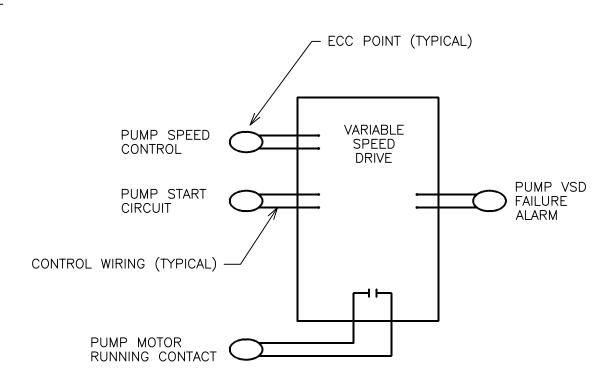
DATE

A. ALL ITEMS THAT REQUIRE ACCESS, SUCH AS FOR OPERATING, CLEANING, SERVICING, MAINTENANCE AND CALIBRATION, SHALL BE EASILY AND SAFELY ACCESSIBLE BY PERSONS STANDING AT FLOOR LEVEL, OR STANDING ON PERMANENT PLATFORMS, WITHOUT THE USE OF PORTABLE LADDERS. EXAMPLES OF THESE ITEMS INCLUDE, BUT ARE NOT LIMITED TO: ALL TYPES OF VALVES, FILTERS AND STRAINERS, TRANSMITTERS AND CONTROL DEVICES.

	MAIN FLOW				PUMP DIS	CHARGE PRESSU	RE AT:		TEMPERATURE		
EQUIPMENT TAG	MINIMUM (GPM)	MAXIMUM (GPM)	NORMAL (GPM)	MINIMUM PUMP FLOW (GPM)	NORMAL FLOW (FT)	BYPASS FLOW (FT)	SHUTOFF (FT)	BYPASS BACKPRESSURE (PSI)	NORMAL (°F)	MAXIMUM (°F)	NOTES
69-P12-ARV	0	185	140	21	410	560	560	20	220	240	1
69-P13-ARV	0	540	140	100	410	410	420	20	220	240	1
69-P14-ARV	0	185	140	21	410	560	560	20	220	240	1
69-P15-ARV	0	125	85	18	410	450	480	20	220	240	2
69-P16-ARV	0	185	140	65	465	575	620	20	220	240	1

DESCRIPTION	TEMPERATURE CONTROL POINT LIST SEE SEQUENCE OF OPERATION IN 23 0923, 3.5							
PUMP 69-P12 STATUS	DESCRIPTION	TYPE	UNIT OR STATUS	ALARM (DESCR)	PROGRAMS	GRAPHICS	NOTES	
PUMP 69-P12 SPEED MODULATION AO %SPEED NO MCO YES VFD CONTROL PANEL	PUMP 69-P12 START/STOP	DO	STA/STO	NO	MCO	YES	VFD CONTROL PANEL	
PUMP 69-P14 STATUS	PUMP 69-P12 STATUS	DI	ON/OFF	YES-STATUS MISMATCH		YES	VFD CONTROL PANEL	
PUMP 69-P14 START/STOP DO STA/STO NO MCO YES VFD CONTROL PANEL	PUMP 69-P12 SPEED MODULATION	AO	%SPEED	NO	мсо	YES	VFD CONTROL PANEL	
PUMP 69-P14 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P14 SPEED MODULATION AO %SPEED NO MCO YES VFD CONTROL PANEL PUMP 69-P14 VFD FAILURE DI ALM/NML YES YES VFD CONTROL PANEL PUMP 69-P15 STATY/STDP DO STA/STO NO MCO YES VFD CONTROL PANEL PUMP 69-P15 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P15 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI ALM/NML YES YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P16 SPEED MODULATION AO XSPEED NO MCO YES VFD CONTROL PANEL PUMP 69-P12 FLOW DI TBL/NML YES	PUMP 69-P12 VFD FAILURE	DI	ALM/NML	YES		YES	VFD CONTROL PANEL	
PUMP 69-P14 SPEED MODULATION AO %SPEED NO MCO YES VFD CONTROL PANEL PUMP 69-P14 VFD FAILURE DI ALM/NML YES YES VFD CONTROL PANEL PUMP 69-P15 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P15 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P15 STATUS DI ALM/NML YES NO MCO YES VFD CONTROL PANEL PUMP 69-P16 STATT/STOP DI ALM/NML YES NO MCO YES VFD CONTROL PANEL PUMP 69-P16 STATT/STOP DO STA/STO NO MCO YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI TBL/NML YES YES FLOW SWITCH, FS-12 PUMP 69-P12 FLOW DI	PUMP 69-P14 START/STOP	DO	STA/STO	NO	МСО	YES	VFD CONTROL PANEL	
PUMP 69-P14 VFD FAILURE DI ALM/NML YES YES VFD CONTROL PANEL PUMP 69-P15 START/STOP DO STA/STO NO MCO YES VFD CONTROL PANEL PUMP 69-P15 STATUS DI ON/OFF YES-STATUS MISWATCH YES VFD CONTROL PANEL PUMP 69-P15 SPEED MODULATION AO %SPEED NO MCO YES VFD CONTROL PANEL PUMP 69-P16 START/STOP DO STA/STO NO MCO YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI ON/OFF YES-STATUS MISWATCH YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI ON/OFF YES-STATUS MISWATCH YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI ON/OFF YES-STATUS MISWATCH YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI ON/OFF YES-STATUS MISWATCH YES VFD CONTROL PANEL PUMP 69-P16 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-12 PUMP 69-P14 FLOW DI TBL/NML YES <	PUMP 69-P14 STATUS	DI	ON/OFF	YES-STATUS MISMATCH		YES	VFD CONTROL PANEL	
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PUMP 69-P15 VFD FAILURE DI ALM/NML YES YES VFD CONTROL PANEL PUMP 69-P16 START/STOP DO STA/STO NO MCO YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI TBL/NML YES YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI TBL/NML YES YES FLOW SWITCH, FS-12 PUMP 69-P12 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-14 PUMP 69-P15 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-15 PUMP 69-P16 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-16 BF-1 PRESSURE (B1,B2,B3) AI PSIG YES YES PRESSURE TRANSMITTER, PT-1	PUMP 69-P15 STATUS	DI	ON/OFF	YES-STATUS MISMATCH		YES	VFD CONTROL PANEL	
PUMP 69-P16 START/STOP DO STA/STO NO MCO YES VFD CONTROL PANEL PUMP 69-P16 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P16 SPEED MODULATION AO %SPEED NO MCO YES VFD CONTROL PANEL PUMP 69-P12 FLOW DI TBL/NML YES FLOW SWITCH, FS-12 PUMP 69-P14 FLOW DI TBL/NML YES FLOW SWITCH, FS-14 PUMP 69-P15 FLOW DI TBL/NML YES FLOW SWITCH, FS-15 PUMP 69-P16 FLOW DI TBL/NML YES FLOW SWITCH, FS-16 PUMP 69-P16 FLOW DI TBL/NML YES FLOW SWITCH, FS-15 PUMP 69-P16 FLOW DI TBL/NML YES PRESSURE TRANSMITTER, PT-16 BF-1 PRESSURE (B1,B2,B3) AI PSIG YES YES PRESSURE TRANSMITTER, PT-1 BF-2 PRESSURE (B1,B2,B3) AI PSIG YES PRESSURE TRANSMITTER, PT-2 BF-1 PRESSURE (B4) AI PSIG YES PRESSURE TRANSMITTER, PT-3 <td>PUMP 69-P15 SPEED MODULATION</td> <td>AO</td> <td>%SPEED</td> <td>NO</td> <td>МСО</td> <td>YES</td> <td>VFD CONTROL PANEL</td>	PUMP 69-P15 SPEED MODULATION	AO	%SPEED	NO	МСО	YES	VFD CONTROL PANEL	
PUMP 69-P16 STATUS DI ON/OFF YES-STATUS MISMATCH YES VFD CONTROL PANEL PUMP 69-P16 SPEED MODULATION AO %SPEED NO MCO YES VFD CONTROL PANEL PUMP 69-P12 FLOW DI TBL/NML YES PUMP 69-P14 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-12 PUMP 69-P15 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-14 PUMP 69-P16 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-15 PUMP 69-P16 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-16 BF-1 PRESSURE (B1,B2,B3) AI PSIG NO MCO YES PRESSURE TRANSMITTER, PT-1 BF-2 PRESSURE (B1,B2,B3) AI PSIG YES YES PRESSURE TRANSMITTER, PT-2 BF-2 PRESSURE (B4) AI PSIG NO MCO YES PRESSURE TRANSMITTER, PT-2 BF-1 PRESSURE (B4) AI PSIG YES YES PRESSURE TRANSMITTER, PT-2 PRESSURE TRANSMITTER, PT-3	PUMP 69-P15 VFD FAILURE	DI	ALM/NML	YES		YES	VFD CONTROL PANEL	
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PUMP 69-P12 FLOW DI TBL/NML YES FLOW SWITCH, FS-12 PUMP 69-P14 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-14 PUMP 69-P15 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-15 PUMP 69-P16 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-16 PUMP 69-P16 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-16 PUMP 69-P16 FLOW DI TBL/NML YES YES PRESSURE TRANSMITTER, PT-16 PUMP 69-P16 FLOW DI TBL/NML YES YES PRESSURE TRANSMITTER, PT-16 PUMP 69-P16 FLOW DI TBL/NML YES YES PRESSURE TRANSMITTER, PT-1 BF-1 PRESSURE (B1,B2,B3) AO PSIG NO MCO YES PRESSURE TRANSMITTER, PT-2 BF-2 PRESSURE (B4) AI PSIG YES YES PRESSURE TRANSMITTER, PT-3	PUMP 69-P16 STATUS	DI	ON/OFF	YES-STATUS MISMATCH		YES	VFD CONTROL PANEL	
PUMP 69-P14 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-14 PUMP 69-P15 FLOW DI TBL/NML YES PUMP 69-P16 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-15 PUMP 69-P16 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-16 PESSURE (B1,B2,B3) AI PSIG YES YES PRESSURE TRANSMITTER, PT-1 BF-1 PRESSURE (B1,B2,B3) AI PSIG YES YES PRESSURE TRANSMITTER, PT-1 BF-2 PRESSURE (B1,B2,B3) AI PSIG YES YES PRESSURE TRANSMITTER, PT-2 BF-2 PRESSURE SETPOINT ADJ (B1,B2,B3) AO PSIG NO MCO YES PRESSURE TRANSMITTER, PT-2 BF-1 PRESSURE SETPOINT ADJ (B1,B2,B3) AI PSIG NO MCO YES PRESSURE TRANSMITTER, PT-2 BF-1 PRESSURE (B4) AI PSIG YES PRESSURE TRANSMITTER, PT-3	PUMP 69-P16 SPEED MODULATION	AO	%SPEED	NO	МСО	YES	VFD CONTROL PANEL	
PUMP 69-P15 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-15 PUMP 69-P16 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-16 BF-1 PRESSURE (B1,B2,B3) AI PSIG YES PRESSURE TRANSMITTER, PT-1 BF-2 PRESSURE (B1,B2,B3) AI PSIG YES YES PRESSURE TRANSMITTER, PT-1 BF-2 PRESSURE (B1,B2,B3) AI PSIG YES YES PRESSURE TRANSMITTER, PT-2 BF-2 PRESSURE SETPOINT ADJ (B1,B2,B3) AO PSIG NO MCO YES PRESSURE TRANSMITTER, PT-2 BF-2 PRESSURE SETPOINT ADJ (B1,B2,B3) AO PSIG NO MCO YES PRESSURE TRANSMITTER, PT-2 BF-1 PRESSURE (B4) AI PSIG YES YES PRESSURE TRANSMITTER, PT-2	PUMP 69-P12 FLOW	DI	TBL/NML	YES		YES	FLOW SWITCH, FS-12	
PUMP 69-P16 FLOW DI TBL/NML YES YES FLOW SWITCH, FS-16 BF-1 PRESSURE (B1,B2,B3) AI PSIG NO MCO YES PRESSURE TRANSMITTER, PT-1 BF-2 PRESSURE (B1,B2,B3) AI PSIG YES NO MCO YES PRESSURE TRANSMITTER, PT-1 YES PRESSURE TRANSMITTER, PT-2 BF-2 PRESSURE (B1,B2,B3) AO PSIG NO MCO YES PRESSURE TRANSMITTER, PT-2 BF-2 PRESSURE SETPOINT ADJ (B1,B2,B3) AO PSIG NO MCO YES PRESSURE TRANSMITTER, PT-2 BF-1 PRESSURE (B4) AI PSIG YES YES PRESSURE TRANSMITTER, PT-2 PRESSURE TRANSMITTER, PT-2 PRESSURE TRANSMITTER, PT-3	PUMP 69-P14 FLOW	DI	TBL/NML	YES		YES	FLOW SWITCH, FS-14	
BF-1 PRESSURE (B1,B2,B3) Al PSIG YES YES YES PRESSURE TRANSMITTER, PT-1 BF-1 PRESSURE SETPOINT ADJ (B1,B2,B3) AO PSIG NO MCO YES PRESSURE TRANSMITTER, PT-1 BF-2 PRESSURE (B1,B2,B3) AI PSIG YES YES PRESSURE TRANSMITTER, PT-2 BF-2 PRESSURE SETPOINT ADJ (B1,B2,B3) AO PSIG NO MCO YES PRESSURE TRANSMITTER, PT-2 BF-1 PRESSURE (B4) AI PSIG YES YES PRESSURE TRANSMITTER, PT-2 PRESSURE TRANSMITTER, PT-3	PUMP 69-P15 FLOW	DI	TBL/NML	YES		YES	FLOW SWITCH, FS-15	
BF-1 PRESSURE SETPOINT ADJ (B1,B2,B3) AO PSIG NO MCO YES PRESSURE TRANSMITTER, PT-1 BF-2 PRESSURE (B1,B2,B3) AI PSIG YES PRESSURE TRANSMITTER, PT-2 BF-2 PRESSURE SETPOINT ADJ (B1,B2,B3) AO PSIG NO MCO YES PRESSURE TRANSMITTER, PT-2 BF-1 PRESSURE (B4) AI PSIG YES YES PRESSURE TRANSMITTER, PT-2 PRESSURE TRANSMITTER, PT-2 BF-1 PRESSURE (B4) AI PSIG YES PRESSURE TRANSMITTER, PT-3	PUMP 69-P16 FLOW	DI	TBL/NML	YES		YES	FLOW SWITCH, FS-16	
BF-2 PRESSURE (B1,B2,B3) Al PSIG YES YES PRESSURE TRANSMITTER, PT-2 BF-2 PRESSURE SETPOINT ADJ (B1,B2,B3) AO PSIG NO MCO YES PRESSURE TRANSMITTER, PT-2 BF-1 PRESSURE (B4) Al PSIG YES YES PRESSURE TRANSMITTER, PT-2 YES PRESSURE TRANSMITTER, PT-3	BF-1 PRESSURE (B1,B2,B3)	Al	PSIG	YES		YES	PRESSURE TRANSMITTER, PT-1	
BF-2 PRESSURE SETPOINT ADJ (B1,B2,B3) AO PSIG NO MCO YES PRESSURE TRANSMITTER, PT-2 BF-1 PRESSURE (B4) AI PSIG YES YES PRESSURE TRANSMITTER, PT-3	BF-1 PRESSURE SETPOINT ADJ (B1,B2,B3)	AO	PSIG	NO	мсо	YES	PRESSURE TRANSMITTER, PT-1	
BF-1 PRESSURE (B4) Al PSIG YES YES PRESSURE TRANSMITTER, PT-3	BF-2 PRESSURE (B1,B2,B3)	Al	PSIG	YES		YES	PRESSURE TRANSMITTER, PT-2	
,	BF-2 PRESSURE SETPOINT ADJ (B1,B2,B3)	AO	PSIG	NO	мсо	YES	PRESSURE TRANSMITTER, PT-2	
BF-1 PRESSURE SETPOINT ADJ (B4) AO PSIG NO MCO YES PRESSURE TRANSMITTER, PT-3	BF-1 PRESSURE (B4)	Al	PSIG	YES		YES	PRESSURE TRANSMITTER, PT-3	
1 - · · · · · · · · · · · · · · · · · ·	BF-1 PRESSURE SETPOINT ADJ (B4)	AO	PSIG	NO	мсо	YES	PRESSURE TRANSMITTER, PT-3	

ABBREVIATIONS
DESCR — DESCRIPTION
MCO — MANUAL CONTROL OVERRIDE
ALM — ALARM
NML — NORMAL
STA/STOP — START/STOP
TBL/NML — TROUBLE/NORMAL



1 PUMP MOTOR VARIABLE SPEED DRIVE (TYPICAL)
NONE

BOILER FEEDWATER PUMP SCHEDULE MECHANICAL (235011) HEAD NUMBLK (FT) OF STAGES VFD WATER SUCTION
(YES/NO) TEMP. (F) NPSHR (FT) SIZE (IN) MANUFACTURER TAG APPLICATION MECHANICAL NOTES 69-P12 MULTI-STAGE 140 410 YES BFW 22.3 3500 230 7.0 GOULDS e-SV 2/2" 22.3 230 2½" 69-P14 140 410 3500 YES 7.0 GOULDS BFW MULTI-STAGE 5 e-SV 69-P15 BFW MULTI-STAGE 70 410 10.6 3500 230 5.3 GOULDS YES e-SV MECHANICAL NOTES:
1. PRODUCT NO. 33SV5GM4F20N
2. PRODUCT NO. 15SV7GK4F20 ELECTRICAL DISCONNECT AT MOTOR CIRCUIT ELECTRICAL **EQUIPMENT** FURNISHED BY/ INSTALLED BY LOCATION NEMA TYPE | INSTALLED BY | LOCATION CONDUIT/FFFDFR SIZE NUMBER NOTES 25 | 460 | 3 VFD DIV 22/DIV 26 AT UNIT DIV 22 60A 50A 1 | DIV 26/DIV 26 | AT UNIT MCC-1E EXT | EXIST EXISTING/3#8 AWG & #10 GND 69-P14 25 | 460 | 3 VFD DIV 22/DIV 26 AT UNIT DIV 22 60A 50A 1 DIV 26/DIV 26 AT UNIT MCC-1E EXIST EXISTING/3#8 AWG & #10 GND 69-P15 15 460 VFD DIV 22/DIV 26 AT UNIT DIV 22 60A 30A 1 DIV 26/DIV 26 AT UNIT MCC-1E EXIST EXISTING/3#10 AWG & #10 GND GENERAL ELECTRICAL NOTES: A. WHEN THE CONTROLLER TYPE IS A VFD OR MAGNETIC STARTER, REFER TO THE VARIABLE FREQUENCY DRIVE CONTROLLER SCHEDULE OR THE MAGNETIC STARTER SCHEDULE FOR MORE INFORMATION. <u>CONTROLLER TYPES:</u>
VFD — VARIABLE FREQUENCY MOTOR CONTROLLER MAGS — MAGNETIC STARTER MMS - MANUAL MOTOR STARTER (WITH OVERLOADS) MRS/MS - MOTOR RATED SWITCH (WITHOUT OVERLOADS) CP - CONTROL PANEL VFD/MAGS - VFD WITH BYPASS OPTION AND EXTERNAL STARTER ELECTRICAL NOTES:

1. REUSE EXISTING MOTOR STARTER CABINET FOR FEEDER CONNECTION. PROVIDE NEW FUSE CLIPS AND OVERLOAD PROTECTINO FOR REDUCED AMPERAGE. BYPASS EXISTING STARTER.

/ECHANIC	CAL/ELE	ECTRIC	AL (230	933)													
			(,	ENCLOSURE			HARMONI	C CONTROL			VFD BYPASS		MULTIPLE	DAMPER	ESSENTIAL	
QUIPMENT TAG	VOLTAGE		CALCULATED AFC	ENCLOSURE TYPE (NEMA 1/4X/12)	PLENUM RATED	SEISMIC BRACING (YES/NO)	VARIABLE TORQUE/ CONSTANT TORQUE	INPUT AC LINE (YES/NO)	OUTPUT AC LINE (YES/NO)	BYPASS (YES/NO)	BYPASS TYPE (CONTACTOR/ VFD)	BYPASS CONTROL TYPE (MANUAL/ AUTOMATIC)	MOTOR STARTING IN	MOTOR CONTROL	CONTROL	SERVICE/ FIRE	LEED REQUIREMENT (YES/NO)
69-P12	480	3	16,280	1	NO	NO	VARIABLE TOURQUE	NO	YES	NO	N/A	N/A	N/A	NO	NO	NO	NO
69-P14	480	3	16,280	1	NO	NO	VARIABLE TOURQUE	NO	YES	NO	N/A	N/A	N/A	NO	NO	NO	NO
69-P15	480	3	16,280	1	NO	NO	VARIABLE TOURQUE	NO	YES	NO	N/A	N/A	N/A	NO	NO	NO	NO

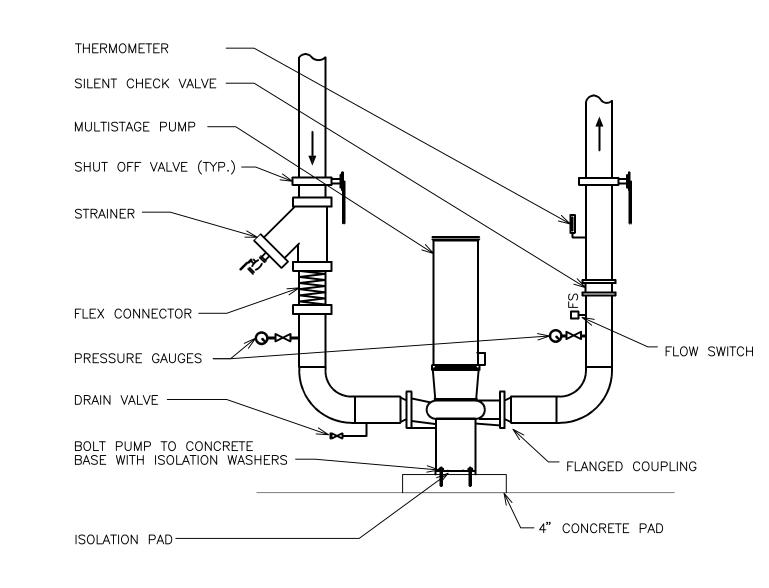
A. FOR VFD'S WITH BYPASS PROVISIONS, SEPARATE MOTOR OVERLOAD PROTECTION REQUIRED FOR EACH MOTOR, WHEN IN THE BYPASS POSITION B. VFD EQUIPMENT SHALL HAVE STANDARD SHORT—CIRCUIT CURRENT RATING HIGHER THAN THE CALCULATED VALUE SHOWN IN THE SCHEDULE. C. VFDS TO HAVE INTEGRAL DISCONNECT UNLESS NOTED OTHERWISE.

DIFFERENTIAL PRESSURE
TRANSMITTER
PRESSURE
TRANSMITTER
BLOWDOWN

ELEVATION

1. INSTALLATION OF SENSORS AND TRANSMITTERS SHALL CONFORM TO RECOMMENDATIONS OF MANUFACTURERS OF TRANSMITTERS.

2 PRESSURE TRANSMITTER INSTALLATION



3 MULTISTAGE PUMP DETAIL
NONE

CD ISSUE FULLY SPRINKLERED

A DATE

one-eighth inch = one foot

0 4 8 16

GENERAL CONTRACTOR AND/OR ALL SUBCONTRACTORS SHALL FIELD VERIFY ALL DIMENSIONS SHOWN ON THESE PLANS AND SHALL BE RESPONSIBLE FOR VARIATIONS BETWEEN PLAN DIMENSIONS AND ACTUAL FIELD DIMENSIONS. WHERE VARIATIONS ARE FOUND TO OCCUR, THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER IN WRITING PRIOR TO PROCEEDING WITH CONSTRUCTION; NO ADJUSTMENT TO THE WORK WILL BE MADE WITHOUT THE PRIOR APPROVAL OF THE PROJECT ENGINEER.

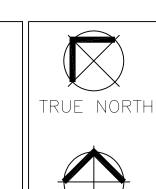
GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR GENERAL DEMOLITION INCLUDING REMOVAL OF WALLS, PARTITIONS, DOORS & CEILING & FLOORS. ANY AND ALL CUTTING OF CONCRETE FLOORS, WALLS OR STRUCTURE SHALL BE THE GENERAL CONTRACTOR'S RESPONSIBILITY. CORE DRILLING THROUGH CONCRETE WALLS, FLOORS OR STRUCTURE FOR PIPING OR CONDUIT SHALL BE THE RESPONSIBILITY OF THE SUBCONTRACTOR BY TRADE; FIRESTOPPING OF THESE OPENING SHALL BE DONE BY THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. PATCHING AND REPAIR OF CONCRETE WALLS, FLOOR, OR STRUCTURE SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR; THIS WILL BE ACCOMPLISHED UPON COMPLETION OF THE INSTALLATION OF ANY AND ALL UTILITIES INSTALLED BY THE VARIOUS SUBCONTRACTORS.

DUNHAM

Dunham Associates, Inc.

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Minneapolis, Minnesota 55402-1540

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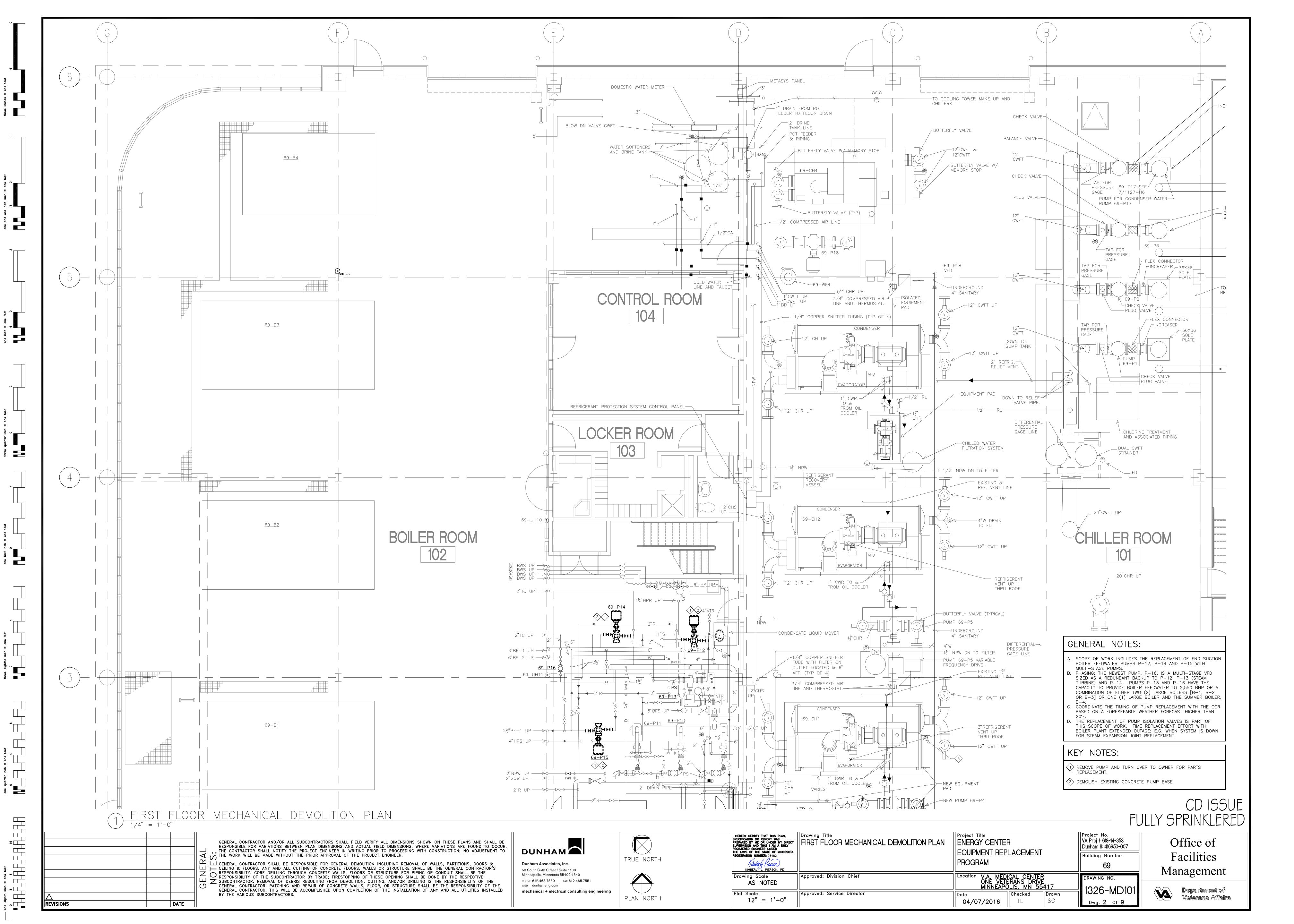


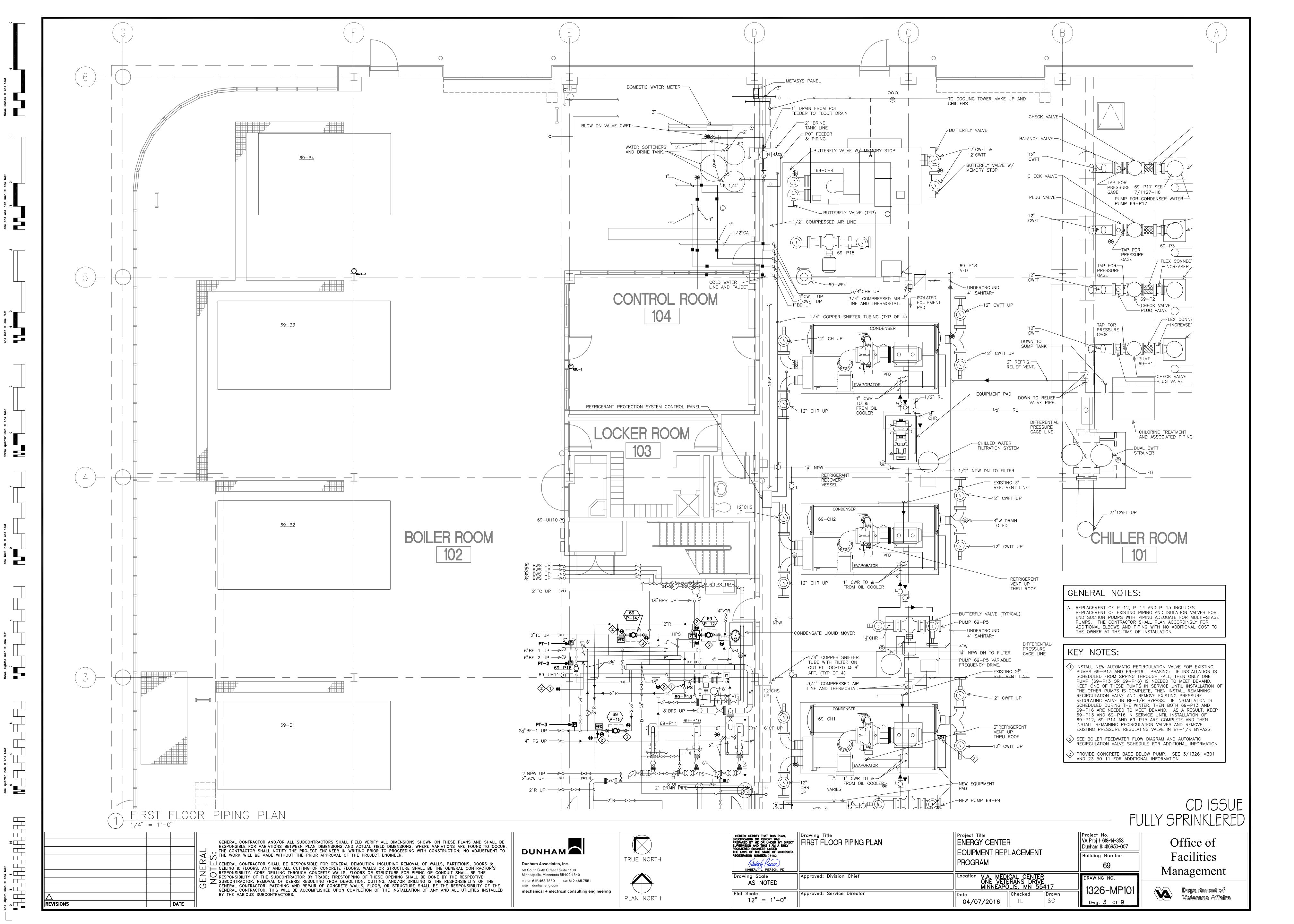
PLAN NORTH

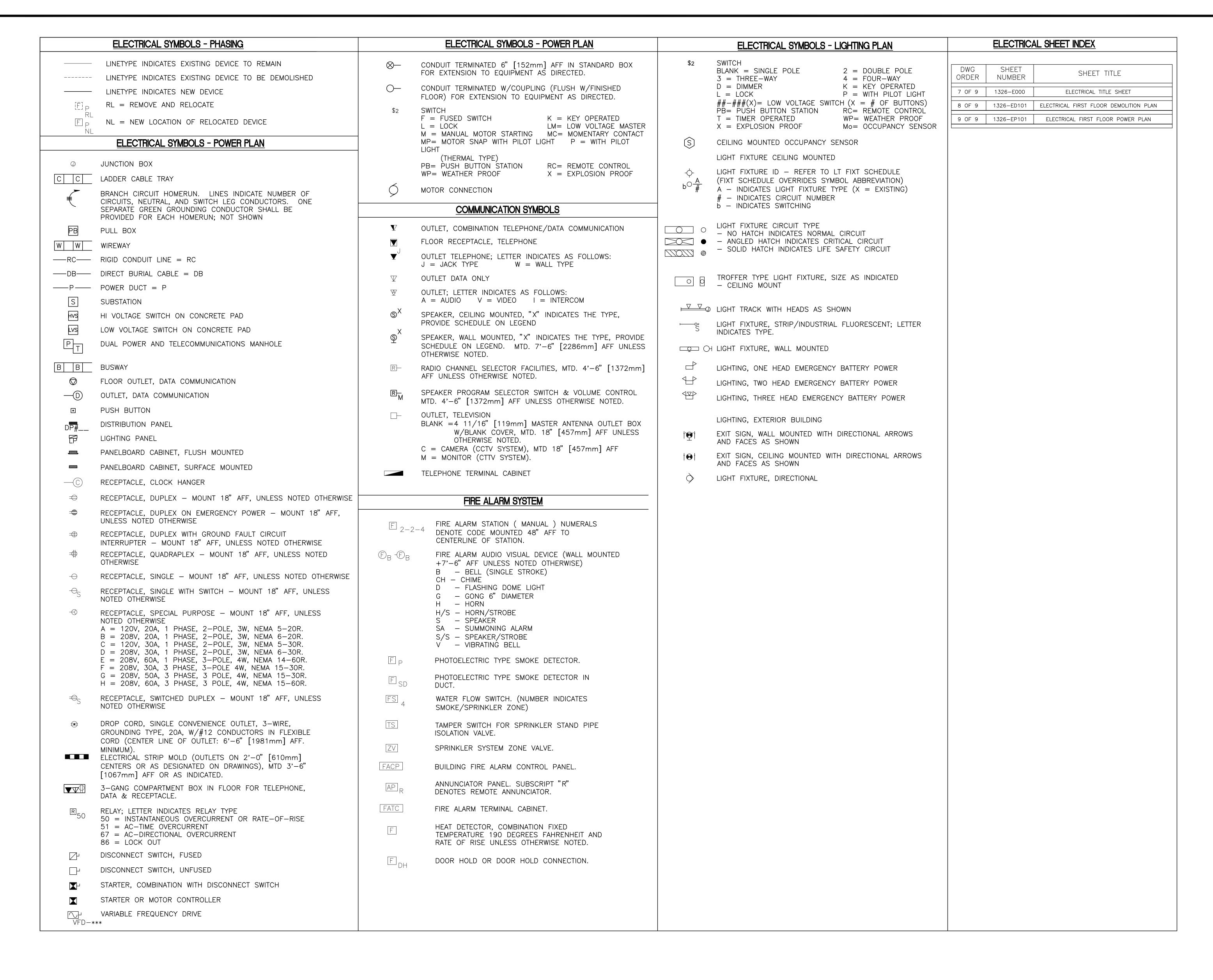
			, 0
I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED ENGINEER UNDER	Drawing Title MECHANICAL DETAILS AND SCHEDULES	Project Title ENERGY CENTER	Project No. VA Proj # 618-14-353: Dunham #: 416950-007
THE LAWS OF THE STATE OF MINNESOTA REGISTRATION NUMBER:		PROGRAM	Building Number 69
Drawing Scale AS NOTED	Approved: Division Chief	Location V.A. MEDICAL CENTER ONE VETERANS DRIVE MINNEAPOLIS, MN 55417	DRAWING NO.
Plot Scale 12" = 1'-0"	Approved: Service Director	Date Checked Drawn	1326-M301 Dwg. 6 Of 9

Office of Facilities Management









CD ISSUE FULLY SPRINKLERED

DATE

one—eighth Inch = one foot

0 4 8 16

GENERAL CONTRACTOR AND/OR ALL SUBCONTRACTORS SHALL FIELD VERIFY ALL DIMENSIONS SHOWN ON THESE PLANS AND SHALL BE RESPONSIBLE FOR VARIATIONS BETWEEN PLAN DIMENSIONS AND ACTUAL FIELD DIMENSIONS. WHERE VARIATIONS ARE FOUND TO OCCUR,
THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER IN WRITING PRIOR TO PROCEEDING WITH CONSTRUCTION; NO ADJUSTMENT TO
THE WORK WILL BE MADE WITHOUT THE PRIOR APPROVAL OF THE PROJECT ENGINEER.

GENERAL CONTRACTOR. PATCHING AND REPAIR OF CONCRETE WALLS, FLOOR, OR STRUCTURE SHALL BE THE RESPONSIBILITY OF THE

BY THE VARIOUS SUBCONTRACTORS.

GENERAL CONTRACTOR; THIS WILL BE ACCOMPLISHED UPON COMPLETION OF THE INSTALLATION OF ANY AND ALL UTILITIES INSTALLED

DUNHAM 🔼 **Dunham Associates, Inc.** 50 South Sixth Street / Suite 1100

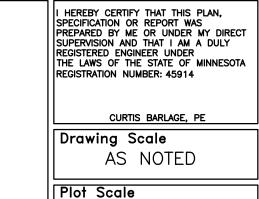
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mechanical + electrical consulting engineering





12" = 1'-0"

Prawing Title ELECTRICAL TITLE SHEET		ENERGY CENTER COUIPMENT REPLACEMENT					
Approved: Division Chief	II ONE VET	DICAL CENTE ERANS DRI' OLIS, MN 5	√E	DRAWING NO.			
Approved: Service Director	Date 04/07/2016	Checked JK	Drawn CB	1326-E00 Dwg. 7 Of 9			

Project No. **VA Proj # 618-14-353**: Office of Dunham # 416950-007 Facilities Management

1326-E000



